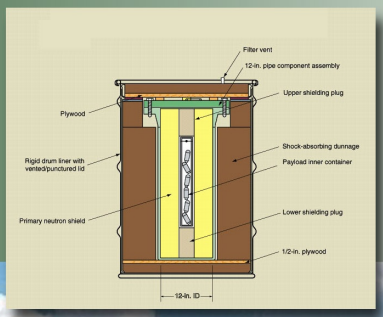
An Assessment of Nuclear Materials Disposition Orphans at the Rocky Flats Site

Nonactinide Isotopes and Sealed Sources Management Group



February 2002

An Assessment of Nuclear Material Disposition Orphans at the Rocky Flats Site

1 INTRODUCTION

EM-1 has defined nine "Key EM Goals/Priorities" for the Environmental Management Program of the Department [DOE, 2001a]. As part of the support for Goal 3, Close Rocky Flats, Fernald, and Mound by 2006, EM-21 (the Office of Nuclear Material and Spent Fuel) tasked the Nonactinide Isotopes and Sealed Sources Management Group (NISSMG) to lead a comprehensive assessment of disposition options for nuclear materials disposition orphans at the Rocky Flats site. The NISSMG performed this evaluation with assistance from the Plutonium Management Group, the Uranium Management Group, the Nuclear Materials Focus Area, the TRU and Mixed Waste Focus Area, and site personnel.

2 PURPOSE

The purpose of this evaluation is to identify all Rocky Flats orphan nuclear materials that have no disposition path. Materials with disposition paths or end-states can also be defined as orphans due to not meeting regulatory requirements, processing needs, or even shipping constraints. Once the issues associated with the nuclear materials were understood and evaluated, recommendations were provided for the disposition. In addition, materials that have defined disposition paths were also reviewed to verify the continuing viability of the existing disposition paths and to determine if there may be alternatives that may reduce costs or provide reuse applications, where there is a clear benefit to Rocky Flats or DOE.

Rocky Flats has material in inventory that must be dispositioned prior to site closure. As facilities are decommissioned, processing, packaging and shipping capabilities are reduced at the site. Closure sites are continuously reevaluating and changing decommissioning and closure activities in an effort to improve on closure schedules and to resolve issues identified during the closure process. The material disposition plans established for Rocky Flats must also be reevaluated on a regular basis to maintain consistency with site closure plans to ensure that changes impacting material disposition are identified and addressed. Capabilities required to implement the disposition plans must be identified for the ongoing reevaluation process.

3 BACKGROUND

Rocky Flats Mission

Rocky Flats was established as a second plutonium and HEU component manufacturing center in 1951. Their chief mission was to produce "pits," which are the core components in the first stages of nuclear weapons, known as "primaries." The Rocky Flats Plant was shut down in December 1989 in order to bring it into compliance with environmental regulations. However,

the plant's defense mission was cancelled in 1992 due to a change in the needs of the nuclear weapon stockpile, and the plant became an environmental management site. Stabilizing and repackaging the plutonium and plutonium-contaminated scrap and residues that remain at the site is the major mission of the Rocky Flats plant today.

When the defense mission for Rocky Flats was cancelled in 1992, a substantial inventory of nuclear materials remained at the site. The nuclear materials inventory was documented in a 1995 assessment [DOE, 1996] and included 62 Metric Tons of depleted uranium, 11,900 kg of plutonium, a classified amount of HEU, Nuclear Material Management and Safeguard System (NMMSS) materials, and 115,000 pieces of weapons components. These materials are shown in more detail in Table 1. Since the mission change, there has been a sustained effort to disposition these materials in order to close the site.

Table 1: Nuclear Material Inventories at the Rocky Flats Site

Material	Form	Amount
Depleted Uranium – Metal	Metal	62 MT
Weapons Components	866 different part numbers	115,000 Pieces – 7,000 ft^3
HEU		Classified
Weapons Grade Plutonium	Metal	5.7 MT
Weapons Grade Plutonium	Oxide	1.6 MT
Weapons Grade Plutonium	Other	4.6 MT
NMMSS Materials	Am-241	Classified
NMMSS Materials	Am-243	Classified
NMMSS Materials	Np-237	Classified

Previous Rocky Flats Disposition Planning

On January 20, 1998, the DOE Office of the Deputy Assistant Secretary for Nuclear Material and Facility Stabilization (then DOE/EM-60) initiated the Nuclear Material Integration (NMI) Project [Kiess, 2000]. The goals of the NMI Project were to inventory and analyze the nuclear materials in the DOE Complex. The scope of this project included not only materials owned by EM but also those owned by other programs and stored in EM facilities. In addition, materials expected to transfer to EM ownership by 2015 were to be considered. The purpose of the analysis was to support both risk and mortgage reduction efforts in the complex and to make recommendations for material management and disposition. The ultimate goal of this effort was

to develop a comprehensive nuclear materials management plan for the complex in support of EM's accelerated cleanup vision.

Four teams were formed to implement the NMI Project. Three material management teams were responsible for the different groups of materials in the DOE Complex:

- Transuranic (TRU) Team, responsible for most transuranic elements
- Uranium/Thorium Team, responsible for most uranium and thorium materials
- NISS Team, responsible for all radioactive isotopes with an atomic number less than 90 and all sealed sources, irrespective of atomic number.

The fourth team formed was the Integration Team, which had responsibility for overall project direction and coordination among the material teams.

As a part of the NMI project, the three material teams visited the Rocky Flats site March 24-26, 1998. These meetings, and subsequent interactions with the site, resulted in the development of a set of baseline nuclear materials disposition maps. These disposition maps [DOE, 1999] were first published in March 1999 and identified 46 nuclear material streams for the Rocky Flats site. At that time, 14 of those streams were identified as having a To Be Determined (TBD) disposition path.

Since that time the material management teams and their successor organization, the material management groups, have worked with the Rocky Flats site to resolve nuclear material management and disposition problems. As an example, the NISSMG issued a report in December 2000 [NISSMG, 2000] that developed disposition paths for all sealed source materials at the site.

In FY2001, EM-21 initiated a project, "Resolve TBD Disposition Paths for EM Nuclear Materials," commonly called the "TBD Project," to initiate a systematic effort to assist sites with nuclear materials for which no disposition path has been defined. The objectives of this project were:

(1) to identify all major categories of nuclear materials that must be managed and dispositioned by EM;
(2) to identify all necessary EM disposition planning that is needed for surplus nuclear materials coming into EM by 2015, and to establish disposition baselines where possible;
(3) to identify integration opportunities (i.e., issues that are appropriate to examine in an integrated, complex-wide manner, as with trade studies or working group assessments); and
(4) to develop the technical information needed to resolve all issues that prevent mature site disposition plans from being formulated and executed.

As a part of the TBD project, the NISSMG and Plutonium Management Groups visited the Rocky Flats site in FY2001. The list of Rocky Flats disposal orphans maintained by the TBD project is included in Appendix A and was used as one of the sources of data to support this assessment.

Methodology

The methodology used in defining final disposition paths for the remaining orphan materials at Rocky Flats includes reviewing existing data, identifying the orphan materials, identifying unique characteristics of the material, evaluating reuse and disposal alternatives, selecting a recommended alternative, validating that the material is viable for the recommended alternative, and finally, facilitating disposition of the material.

- Review Existing Data – The NISSMG team reviewed the IPABS database, previous material management and disposition plans, EM-21 TBD project lists of site disposal orphans, and local site database information.
- Identify Orphan Materials – Orphan materials are those items that have no defined disposition path. Each stream was evaluated to identify the hard to disposition items. In addition, during the review of the data, the NISSMG team elicits additional information to determine if there are items or streams that may not have been captured in the previous investigations.
- Identifying Material Characteristics – Each item that is identified as a potential orphan is discussed in detail to qualitatively define the characteristics. Where analytical data is available, it is reviewed to support the material disposition determination. This function supports the selection of potential disposition alternatives.
- Reuse and Disposal Alternatives – Based on the material characteristics, reuse applications are evaluated first. Where feasible, material is returned for use within the DOE Complex. Reuse alternatives are evaluated to ensure that the application can be accomplished within the schedule constraints of the closure site. The NISSMG team is knowledgeable of the disposal requirements at Hanford, NTS, and Envirocare and is also aware of treatment and processing capabilities required prior to disposal.
- Recommended Alternative – In consideration of material characterization data, site schedules, processing capabilities, and reapplication feasibility, an alternative is recommended.
- Alternative Validation – The validation of the alternative occurs after the NISSMG team communicates with the receiving site. NISSMG provides the characterization data and material information to the receiving site and facilitates the receipt of additional information where required.
- Material Disposition – The final step in the process is the disposition of the material. NISSMG facilitates the disposition as needed to support the closure site and receiving site requirements. This effort can range from simple logistical support through

identification of shipping containers and detailed transportation and packaging analysis to support DOE and DOT requirements.

Following the above methodology provides the structured rigor necessary to facilitate material disposition within the highly regulated radioactive and hazardous material environment.

4 MANAGEMENT DISPOSITION PLANS

Following the disposition methodology, the NISSMG team utilized the baseline material disposition maps as the foundation for this analysis to determine potential impacts associated with orphan materials. Detailed meetings were held at Rocky Flats on January 15, 2002 and each disposition map was reviewed and discussed in detail to identify all of the information available for each material stream. Rocky Flats personnel provided current database information where available and provided additional detail on each stream through elicitation of information by the NISSMG Team. The following material disposition maps for Rocky Flats present the current baseline and identify recommended disposition paths for all items based on the information received from the site, knowledge of reuse and reapplication opportunities, knowledge of current onsite processing capabilities and knowledge of waste disposal requirements. The discussion that follows is organized by the groups of materials listed as TBD in the Rocky Flats orphan materials list (Appendix A) [Kiess, 2001].

4.1 Depleted Uranium

4.1.1 RCRA Suspect Roaster Oxide

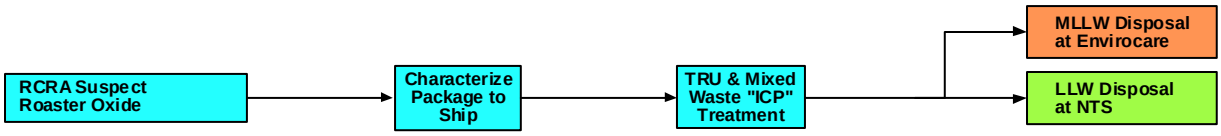
The RCRA suspect roaster oxide material stream includes 318 containers of depleted uranium (DU) chips and turnings generated as a result of machining operations. There is also one 5-gallon steel drum that may be uranium fines. This stream was generated prior to January 1988 when machined DU was degreased using 1,1,1- trichloroethane or 1,1,2- thrichloro -1,2,2-trifluorethane and carries the F001 RCRA listed waste code. Characterization for Volatile Organic Compounds (VOCs) indicates detection of the solvents as well as acetone and toluene. All VOC concentrations are below land disposal restriction (LDR) criteria and therefore do not require treatment for the F listing. During operations, some debris (gloves, DU metal chunks, paper filters, etc.) may have been added to these drums. This debris was not known to have been contaminated with hazardous constituents.

In addition to the Roaster Oxide, 8 to 12 drums of this stream are not true roaster oxides but are uranium oxide plenum filter sludges, which are possibly wet. These drums will require stabilization prior to disposal.

The TRU and Mixed Waste Focus Area (TMFA) has established an Integrated Contractor Procurement (ICP) for the treatment and disposal of uranium and thorium chips [TMFA, 2002].

This contract specifically includes the treatment of materials with hazardous chemical constituents and is accessible to all sites in the complex. The TMFA is interested in treating a small number of Rocky Flats drums to demonstrate this capability. Rocky Flats could then use the contract to treat the remaining drums of material.

Recommendation: Use the Integrated Contractor procurement of the TRU and Mixed Waste Focus Area to treat these materials for disposition as mixed low-level waste.



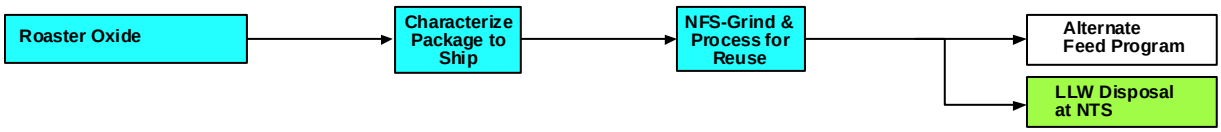
4.1.2 Roaster Oxide

The Roaster Oxide material stream is comprised of DU chips and turnings generated as a result of machining operations. This stream of 296 55-gallon drums was generated after January 1, 1988, which was the date that non-hazardous solvents were utilized initially as degreasers. The roasting operations included a residence time in the roaster of approximately 2 hours per drum at approximately 900 degrees F.

Roaster Oxide was collected in 30-gallon drums that were overpacked into 55-gallon drums with vermiculite placed in the annular space. The Roaster Oxides are considered legacy wastes and will require resolution of administrative and technical issues prior to disposal as LLW at NTS. Technical issues will include demonstration to NTS that the waste is not pyrophoric, i.e., the DU chips were sufficiently oxidized in the roaster.

The baseline disposition for this material is disposal as LLW at NTS. The NTS disposal path is well defined and administrative and technical issues requiring resolution will require significant effort but will not inhibit ultimate disposal as LLW at NTS. As an alternative, disposition through the Alternate Feed Project [UMG, 2001] should be considered. The Uranium Management Group (UMG) is developing this process, with a commercial partner, to blend excess uranium materials in the DOE complex. The roaster oxide materials would be blended with other materials to ~0.7 wt% ^{235}U to meet uranium mill specifications. Reuse of uranium materials in the Alternate Feed Project will reduce uranium materials going to waste and has the potential to reduce the disposition cost for the materials.

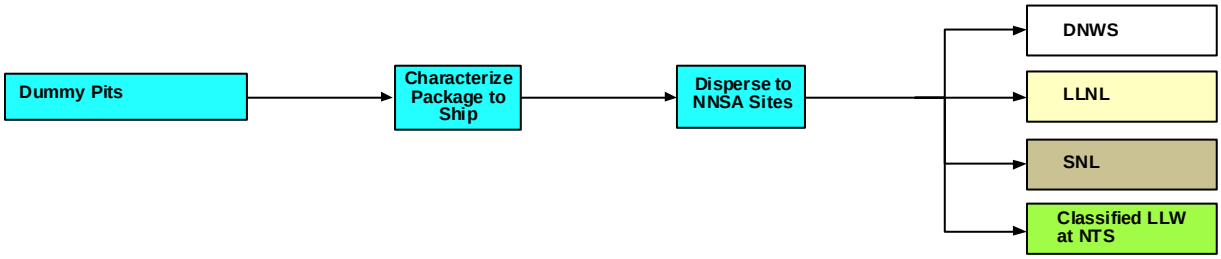
Recommendation: Continue to pursue disposal of this material as low-level waste. Also, inform the Uranium Management Group of the availability of this material for the Alternate Feed Program.



4.1.3 Dummy Pits

There are 50 Dummy Pits identified in the Rocky Flats inventory [NPD, 2000]. These dummy pits were fabricated at a high cost to support previous programmatic needs and were typically fabricated with DU, stainless steel, and aluminum. The dummy pits are managed in the material disposition plan as a single family of items without regard to material type. The baseline disposition of these items is classified LLW disposal at NTS. However, DOE/AL has recognized a need for some of these items and has requested that some of these be shipped to Lawrence Livermore National Laboratory (LLNL), Sandia National Laboratories (SNL), and Defense Nuclear Weapons School (DNWS). The remaining items will maintain the baseline path of disposal at NTS. A detailed listing of the dummy pits and the recommended destination is included in Appendix B.

Recommendation: Pursue reuse of dummy pits through transfer of the material to the select sites identified in Appendix B. Dispose of all dummy pits not readily accepted by receiving sites for reuse. Disposal should be as classified LLW at NTS.



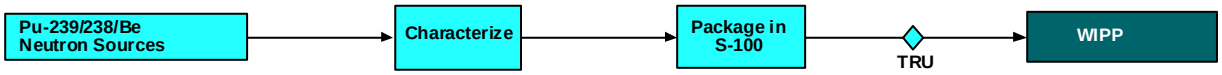
4.2 Sealed Sources

4.2.1 Neutron Sources

This material stream has three Pu-239/Be and two Pu-238/Be neutron sources. The NISSMG is performing a complex-wide assessment of DOE neutron sources [NISSMG, 2002] and has determined that there is one clear disposition path for these sources. The Offsite Source Recovery Project (OSRP) managed by DOE-AL has the responsibility of recovering and disposing of commercial neutron sources and is in the process of expanding their mission to support DOE closure sites. To this end, the OSRP has developed a packing system (S100) that can be used for direct disposal of excess neutron sources at WIPP. The S100 was approved in Rev. 19 of the TRUPACT II Safety Analysis Report in CY2001 [DOE, 2001b]. The S100 is currently undergoing changes in manufacturing technologies and these changes will be incorporated in Rev. 21 of the TRUPACT II Safety Analysis Report in CY2002.

The five neutron sources have a total of 6.7 Ci of activity. One of the Pu-238/Be sources contains 6 Ci of activity and this source will require special handling to repackage in the S100. As Rocky Flats no longer operates or maintains hot cell facilities, it is recommended that Rocky Flats use the repackaging capability of the OSRP to repackage these sources.

Recommendation: Declare the sources excess and transfer to the Rocky Flats TRU program for disposal at WIPP utilizing the OSRP to repackage these sources in the S100 package.



4.2.2 Legacy ALPHA MET Check Sources

These 3600 sources were manufactured at Rocky Flats as instrument check sources and can be divided into three categories: 1) check sources for Ludlum 12-1A instruments; 2) glove box Alpha Met check sources; and 3) miscellaneous disc/wafers. Most of these sources are Pu-239, however some are Am-241 or other isotope sources.

In December 1999, the NISSMG staff was asked by the Rocky Flats Field Office to explore alternate disposal options for these sources because the estimated cost to individually characterize, profile, package and ship the 3600 items in accordance with the NTS WAC was very expensive. The NISSMG staff determined the problem warranted a novel approach and prepared a plan [NISSMG, 2001a] to individually characterize a fraction (~15%) of the legacy sources and use this data to model the activity levels of the entire 3600 items. The model would then be validated via "Mass or Bulk" characterization of all the sources. Once the "Mass or Bulk" characterization validated the model, the entire inventory of sources could be disposed in a single standard waste barrel as LLW. This methodology is based on accepted practices for characterization of surface contaminated objects.

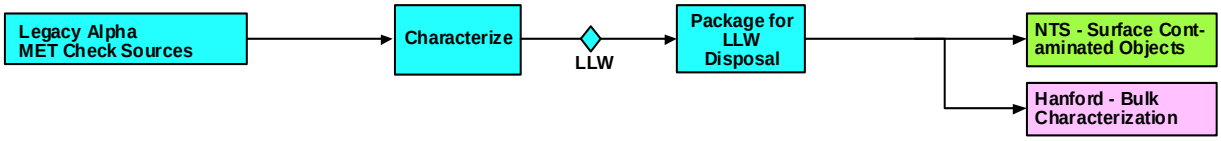
The NISSMG informally proposed using this method to both NTS and Hanford Disposal Sites. The informal response from Hanford was they indeed were confident a formal waste profile could be prepared and the sources can be disposed as Class 3 LLW.

NTS took a more conservative position, stating that the "NTS Position Paper for the Disposal of Sealed Sources" [NTSWAC, 1997] requires individual characterization of each sealed source. However, NTS did state they would review the "Bulk or Mass" characterization methodology if a formal waste profile is submitted.

In the interim, Rocky Flats staff have continued efforts to identify "process knowledge" for all legacy materials. It has been determined the manufacturing technology used to produce the

Legacy Alpha MET Check Sources may indeed qualify these sources as surface contaminated objects, which also supports the waste profile requirements for bulk characterization.

Recommendation: Continue effort to dispose the legacy check sources as surface contaminated objects at NTS. If this methodology fails, dispose at Hanford using the "Bulk or Mass" characterization model.



4.3 Samples, Standards, & Technical Materials

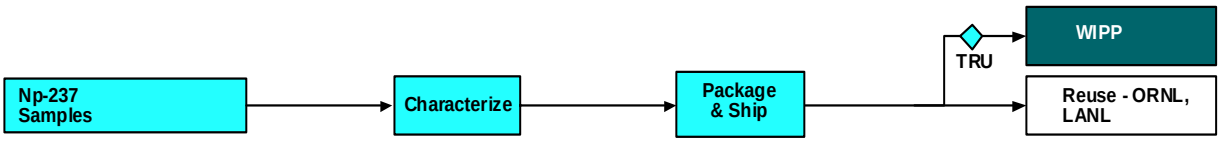
4.3.1 Np-237

This inventory consists of ~ 40 small standards. Typically, for gram quantities or larger, there are reuse options at LANL or LLNL. There is also interest in Np-237 for use in the ongoing Office of Nuclear Energy (NE-50) mission to produce Plutonium-238 for space application at ORNL.

For smaller quantities of Np-237, a few reuse applications have been found commercially at Analytical Laboratories, but these requests are not timely or predictable.

Excess Np-237, in gram quantities, can be disposed as TRU waste at WIPP.

Recommendation: Pursue reuse alternates for larger quantity Np-237 standards at LANL, LLNL, or ORNL. For small quantities, dispose as TRU waste at WIPP.

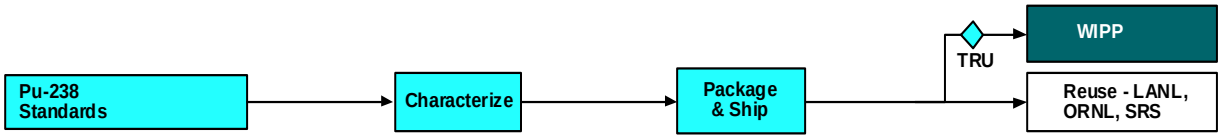


4.3.2 Pu-238 Standards

Database records indicate there are 42 Pu-238 standards; these all appear to be calorimetry standards. Historically calorimetry standards were fabricated at Mound or LANL and these standards could be returned and recalibrated for reuse. Mound no longer performs this function, but LANL has an active Pu-238 mission. Additionally, ORNL has recently accepted high purity Pu-238 material for R&D activities in support of the NE-50 space application.

Small or impure quantities of Pu-238 can be disposed as TRU waste at WIPP.

Recommendation: Pursue recycle for reuse of the Pu-238 standards at either LANL or ORNL. For small quantity or impure materials, dispose as TRU waste at WIPP.



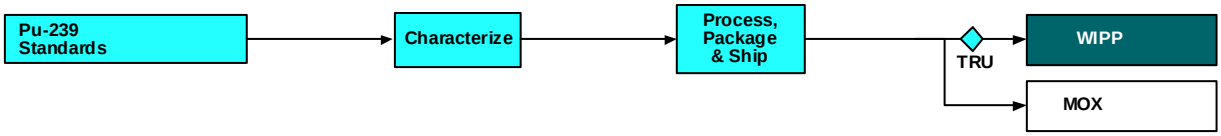
4.3.3 Pu-239 Standards

There are over 700 Pu-239 standards at Rocky Flats. Inventory data reveals there are about 45 large items over 200 grams and the remaining items are very small nanocurie quantities. The site has provided preliminary information on the items that have in excess of 200 grams per item. The items comprise numerous material forms: oxide in diatomaceous earth, oxide in room temperature vulcanizing [RTV] silicone rubber, pure oxide in cans, mixed oxides, ash, salts, graphite, and ones in which the matrix or form is currently unknown. Preliminary data indicates three large standards are in the RTV matrix. Most of these material forms are difficult to process for use in the MOX Fuel Program. Only some of the larger pure oxide standards or the kg quantity standards may be suitable for processing to meet the 3013 standard [DOE, 2000a] for potential use in the MOX Fuel Program. Additional information and characterization by the site will be required to evaluate the appropriate options for these items. If they are not suitable with processing to meet the 3013 standard, then disposal as TRU waste will be the most reasonable option.

Current plans call for the large items to be sectioned and repackaged in the glovebox line in Building 337. The large items will require sectioning and repackaging to meet 200 fissile gram equivalent limit in “Section 6.2 Criticality Evaluation, Package Fuel Loading” - Requirements of Rev. 19, May 2001 TRUPACT II Safety Analysis Report [DOE, 2001b]. Evaluation of those in the RTV matrix against gas generation limits will be required. Measurement of the gas generation rate may be possible in the unit on loan to RFETS.

Site personnel will need to provide characterization information on the smaller items. Based on the information for the larger items, there are a wide variety of material forms. For the smaller items, there are no known reuse applications; therefore, disposal as TRU waste is the only reasonable option. Once the material forms are known, they can be evaluated against existing RFETS TRU waste streams. Ongoing efforts will be required to evaluate the disposition options, as the site characterizes these items.

Recommendation: Identify items that may be suited, with processing, to meet the 3013 standard. Pursue cutting and sectioning the material to meet the fissile gram equivalent of the TRUPACT II shipping container. Sectioning of material may be performed in onsite facilities or through the use of mobile facilities. Evaluate small quantity items against existing TRU waste streams as site characterizes these items.



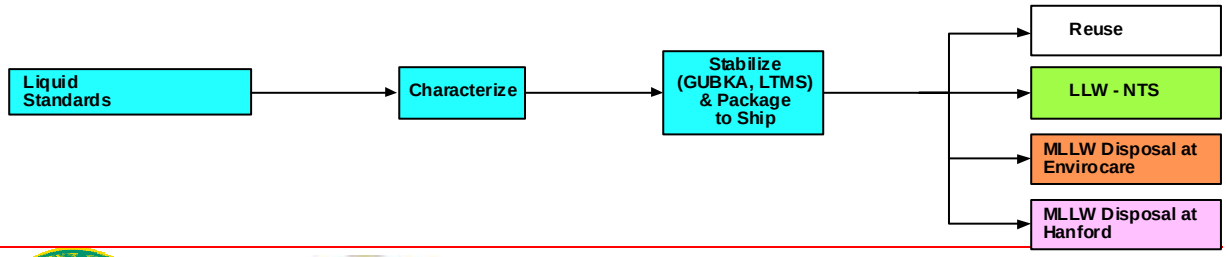
4.3.4 Liquid Standards

Rocky Flats has a small but diverse inventory (19 isotopes of 10 elements) of liquid technical materials that must be stabilized before disposition. The original site baseline called for calcining these materials and disposal as waste. The calcining option is no longer available.

The Rocky Flats inventory of liquid standards contains a number of potentially valuable isotopes, such as ^{244}Cm, ^{154}Eu, ^{232}U, ^{234}U, ^{236}U, ^{238}Pu, and ^{242}Pu. These materials should be evaluated with regards to quantity and purity to determine if other sites are interested in receiving these materials. If there is no interest in immediate reuse for these materials, they should be disposed as waste.

Stabilization methods exist, but there are few cost-effective alternatives when materials contain hazardous constituents. The complete inventory of Rocky Flats liquid technical materials is being evaluated as part of the NISSMG Liquid Technical Material Trade Study [NISSMG, 2001b]. This study will provide a suite of alternates for Rocky Flats to utilize. The suite of solutions range from "Off the Shelf" stabilization products such as Petroset® to Gubka, a Russian absorbent technology. All of these methods can be accomplished in existing Rocky Flats facilities or may be performed using a variety of mobile applications.

Recommendation: Evaluate all liquid standards for reuse potential and transfer any items for which there is immediate interest to receiver sites. Stabilize all remaining materials for disposal as waste as recommended by the Liquid Technical Materials Trade Study.

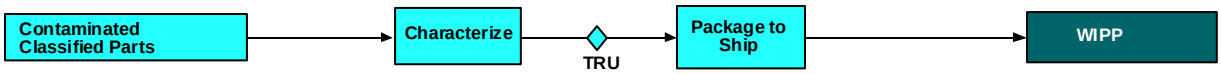


4.4 Other TBD's

4.4.1 Contaminated Classified Parts

The problem of legacy contaminated classified parts exists at many sites across the DOE complex. In October 1999, a DOE AL led working group was formed to perform a complex-wide assessment and make recommendations for these materials. In July 2000, the working group issued a report [DOE, 2000b] that recommends direct disposal at WIPP, pending resolution of a variety of institutional issues. DOE HQ directed that TRU contaminated classified parts be disposed of at WIPP for Rocky Flats. In the summer of 2001 a modified security plan was approved that would allow the WIPP to receive these materials. A draft implementation plan to perform the necessary security and permit modifications at the WIPP site is in preparation. Pending funding of this plan, the WIPP site should be able to receive the Rocky Flats materials in the first quarter of FY2003.

Recommendation: Continue to pursue direct disposal of the contaminated classified parts at WIPP.



4.4.2 Special Items

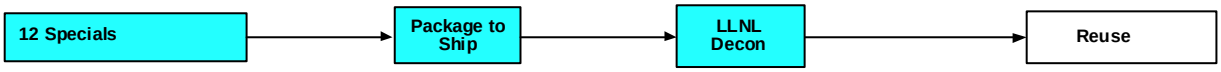
The composition and configuration of (some) weapons components are classified. Disposition of these items requires special processing to recover and sanitize the components. At present, there is no facility in the complex to disposition these items.

Recently, the Rocky Flats site, LLNL, and the Nuclear Materials Focus Area (NMFA) developed a proposal to the Office of Science and Technology (OST) to design, procure, and install a system to process these items. The proposal has been funded and work is under way to ship these items to LLNL.

Recently however, it has been determined that these items are in a mechanical configuration that will complicate transportation. Rocky Flats is presently working with the Transportation Safeguards Division at DOE/AL to develop a means to transport the items. However, transporting these items in their current configuration will require an exemption, which in the opinion of the study team has a high programmatic risk.

It is therefore recommended that the special items at Rocky Flats be mechanically processed at the site to convert them to the originally expected configuration. Using this approach, Rocky Flats will be able to leverage ongoing work to modify the certificate of compliance of an existing container to transport similar items from other sites.

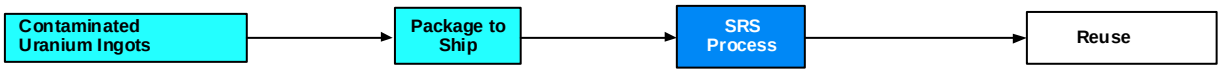
Recommendation: Mechanically process the special items to convert them to the originally expected configuration. Then transport the items to LLNL for processing.



4.4.3 Greasy Specials (Contaminated Uranium Ingots)

The items identified as the "greasy specials" in previous studies have now been determined to be plutonium contaminated uranium ingots without significant organic contamination. Arrangements are currently being made to ship these items to the Savannah River Site for processing as "Off-Spec Highly Enriched Uranium [DOE, 2001c]." There appear to be no significant issues in effecting this transfer.

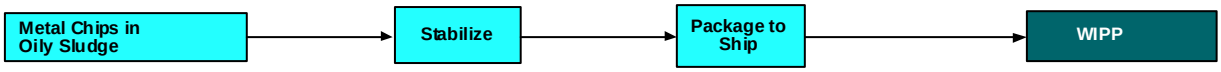
Recommendation: Ship the plutonium contaminated uranium ingots to the Savannah River Site for processing as "Off-Spec Highly Enriched Uranium."



4.4.4 Metal Chips in Oil

However, in discussions with Rocky Flats site personnel, another potentially problematic group of materials has been identified. This group of materials is described as "metal chips and fines in oily sludge." There is no approved process at the Rocky Flats site to degrease these plutonium materials for stabilization. The presence of organic materials with nuclear materials makes this group problematic for offsite treatment. The site has developed an alternative to blend this material with an inert clay-based absorbent for disposition at WIPP. This process appears viable if the material is blended such that the plutonium concentration is below the 10-wt% Safeguards Termination Limits requirement and that the concentration of any pyrophoric constituents is below the 1 wt% WIPP limit.

Recommendation: Continue to pursue the site developed alternative to blend the "metal chips and fines in oily sludge" for disposition at WIPP. Contact either the NMFA or the TMFA should technical issues arise for this disposition path.



4.5 Recommendations

The above material management disposition plans identify the material issues that are considered in determining recommended disposition paths. These issues have been considered and the following recommendations are made for each path. In addition, the clear benefit derived from the recommended disposition path is included to support the selection of the preferred alternative.

Material Stream	Recommendations	Benefit
RCRA Suspect Roaster Oxides	This material should be evaluated in the near term working with Envirocare to determine the extent of repackaging or stabilization that will be required prior to LLW disposal.	Involving the disposal site now will help define the extent of characterization, stabilization, and repackaging that may be required resulting in cost savings.
Roaster Oxides	Continue efforts to dispose as LLW at NTS.	Disposal at NTS is a developed path for Rocky Flats and provides cost effective disposition of this material.
Dummy Pits	Transfer dummy pits to select sites identified in Appendix B for reuse. Dispose only those dummy pits that are no longer desired.	There are a variety of areas within DOE where excess dummy pits may be reapplied. Reapplication will save in characterization and disposal costs and will provide DOE sites with these needed items for programmatic use and eliminate destruction of unique irreplaceable items.
Neutron Sources	Declare the sources excess and transfer to the Rocky Flats TRU program for disposal at WIPP utilizing the OSRP to repackage these sources in the S100 package.	OSRP provides turnkey support for repackaging efforts. Disposal at WIPP provides most expedient disposition path for removal of material from Rocky Flats.

Material Stream	Recommendations	Benefit
Legacy Alpha MET Sources	Continue effort to dispose of surface contaminated objects at NTS. If this methodology fails, dispose at Hanford using the "Bulk or Mass" characterization model defined in the NISSMG bulk characterization evaluation.	NTS disposal provides the most practical and cost effective disposition path, but is unlikely. The Hanford disposal path is feasible and groundwork has been laid to support bulk characterization through the NISSMG Bulk Characterization evaluation.
Np-237	Pursue reuse alternatives for larger quantity Np-237 standards at LANL, LLNL, or ORNL. For small quantities and all large quantity items that are not readily dispositioned for reuse, dispose as TRU waste at WIPP.	Np-237 is a valuable commodity at these DOE sites warranting pursuit of reuse. The disposal path at WIPP is the most expedient means of removing the smaller items from Rocky Flats. This path will also support the larger items if reuse cannot be implemented in a timely manner.
Pu-238 Standards	Recycle for reuse the Pu-238 standard at either LANL or ORNL. For the small quantity or impure standard, dispose as TRU waste at WIPP.	Pu-238 is a valuable commodity at these DOE sites warranting pursuit of reuse. The disposal path at WIPP is the most expedient means of removing the smaller items from Rocky Flats. This path will also support the larger items if reuse cannot be implemented in a timely manner.
Pu-239 Standards	Identify items that may be suited for processing to meet the 3013 standard. Pursue sectioning the material to meet the FGE requirements of the TRUPACT II.	Disposal at WIPP is the most expedient way to remove the material from Rocky Flats.
Liquid Standards	Evaluate standards for reuse and stabilize remaining materials for disposal as LLW at NTS.	Reuse and reapplication is the preferred path for nuclear materials. Remaining materials requiring stabilization can utilize the processes identified in the Liquid Technical Materials Trade Study.
Contaminated Classified Parts	Continue to pursue direct disposal of contaminated classified parts at WIPP.	Direct disposal at WIPP has been approved by HQ and is the most cost effective means of disposition. Direct disposal eliminates the need to sanitize the material prior to disposal.
Special Items	Mechanically process the special items to convert them to the originally expected configuration. Transport the items to LLNL for processing.	Process and ship to LLNL is the only identified disposition path for this material.

Material Stream	Recommendations	Benefit
Greasy Specials (Contaminated Uranium Ingots)	Ship the plutonium contaminated uranium ingots to the Savannah River Site for processing as "Off-Spec Highly Enriched Uranium."	Disposition paths are now defined for these items. This path will provide for timely and cost effective disposition of these materials.
Metal Chips in Oil	Continue to pursue the site developed alternative to blend the "metal chips and fines in oily sludge" for disposition at WIPP. Contact either the NMFA or the TMFA should technical issues arise for this disposition path.	Direct disposal at WIPP will provide the most cost effective solution for these materials.

4.6 Conclusion

All of the materials identified in this management and disposition plan have a feasible baseline disposition path for removal of the material from Rocky Flats. Limited technology development is required for some material streams and transportation issues exist for several streams. There will be difficulties and technical issues associated with some of the disposition paths but with adequate funding and personnel resources these details can be managed consistent with site closure requirements. The following items should be managed with special attention to ensure that schedules for disposition of these items do not slip to the point that material disposition becomes a critical path element to site closure:

Special Items

- 12 Specials – The process to convert special items into the expected configuration is defined. Rocky Flats must work with LLNL to define the schedule and onsite location of the operation.

Depleted Uranium

- RCRA Suspect Roaster Oxides - This material should be evaluated in the near term working with the disposal site to determine the extent of repackaging or stabilization that will be required prior to mixed LLW disposal.

Pu-239 Items

- Over 700 items – With the numerous varieties, wide range of quantities per item, and limited characterization data available currently, this stream will require characterization by the site of each of the items, evaluation of the larger ones against processing options to package to the 3013 standard for potential use in the MOX Fuel Program, and evaluation against existing TRU waste streams and sectioning of the larger items to meet the fissile limit of the TRUPACT-II.

In the development of feasible disposition paths for all materials, the NISSMG team has also identified potential alternatives that have benefit for the DOE Complex if implemented and

would not impact site closure activities or schedules. These alternatives provide reuse of valuable materials within the complex, meet waste minimization and recycle goals, and do not impact site closure activities or schedules.

Finally, it is imperative that Rocky Flats and NISSMG maintain communication to address issues that arise through the identification of new materials requiring disposition, identification of characterization information that inhibits a recommended disposition path, and changes in site capabilities that may impact the ability to characterize, package, and transport. NISSMG is available to facilitate support of the ever-changing conditions of closure sites.

4.7 Path Forward

The path forward for the disposition of material should link directly with the closure activities and schedules for Rocky Flats. All of the materials have been determined to have feasible disposition end states, thus the path forward should lead to complete disposition of all materials with no impact to site closure schedules. In order to minimize programmatic risks of material disposition, the following should be implemented:

- Proceed with recommendations on material disposition included in this evaluation.
- Contact the NISSMG team in the event that any barriers are identified that impact the material stream disposition path recommendations.
- Consider utilizing the NISSMG team in evaluation and disposition of nuclear waste streams at Rocky Flats.
- Evaluate material disposition activities at least quarterly to determine if modifications to disposition paths are necessary as changes in facility capabilities or disposal requirements are identified.

5 REFERENCES

DOE, 1996 "Taking Stock: A Look at the Opportunities and Challenges Posed by Inventories of the Cold War Era," DOE/EM-0275, January 1996.

DOE, 1999 "NM Stewardship Program - Predecisional Draft Nuclear Material Disposition Maps by Site," March 1999.

DOE, 2000a DOE-STD-3013-2000, DOE Standard, "Stabilization, Packaging, and Storage of Plutonium-Bearing Materials," September 2000.

DOE, 2000b "TRU-Contaminated, Classified Material: Preliminary Assessment of Disposition Options," DOE/AL, Staff Concurrence Version, July 19, 2000.

DOE, 2001a "Environmental Management Priorities," Memorandum from Jessie Hill Roberson, EM-1, November 19, 2001.

DOE, 2001b Safety Analysis Report for the TRUPACT-II Shipping Package, Westinghouse TRU Solutions for DOE/CFO, TRUPACT-II SAR, Rev. 19, May 2001.

DOE, 2001c "Unallocated Off-Specification HEU: Recommendations for Disposition," NNSA/NN-0014, Revision 0, September 28, 2001.

Kiess, 2000 "Nuclear Materials Management in the Environmental Management Program," Thomas Kiess, et. al., Spectrum 2000, International Conference on Nuclear and Hazardous Waste Management, Chattanooga, TN, September 24-28, 2000.

Kiess, 2001 "Summary of Rocky Flats Nuclear Materials "TBDs" & EM-21 Nuclear Materials Stewardship Program Recommendations, in FY00-01" Draft, Thomas Kiess, EM-21, February 2001.

NISSMG, 2000 "Rocky Flats Sealed Source Management Plan," Nonactinide Isotopes and Sealed Sources Management Group, December 2000.

NISSMG, 2001a "Fiscal Year 2000 Annual Report," Nonactinide Isotopes and Sealed Sources Management Group, January 2001.

NISSMG, 2001b "Liquid Technical Standards Materials Management Assessment, " Interim Report, Nonactinide Isotopes and Sealed Sources Management Group, September 2001.

NISSMG, 2002 "A Methodology for Disposition of DOE Neutron Sources, Report of the Neutron Source Trade Study Working Group," draft, Nonactinide Isotopes and Sealed Sources Management Group, February 2002.

NPD, 2000 "Dummy or Mock Pits at Rocky Flats Environmental Technology Site (RFETS)," Memorandum from Nazir Khalil, Nuclear Programs Division, DOE/AL to David A. Hicks, Facilities Closure Group, DOE-RFFO, October 20, 2000.

Sandia National Laboratories

NTSWAC, 1997 "Position Paper on the Proper Characterization and Disposal of Sealed Radioactive Sources, " DOE/NV Radioactive Waste Acceptance Program and the NTSWAC Working Group, Revision 2, October 1997.

TMFA, 2002 "Treatment and Disposal of Uranium and Thorium Chips," TRU & Mixed Waste Focus Area, OR01MW22(02), 2002

UMG, 2001 "Alternate Feed Project," Uranium Management Group, Oak Ridge Operations, 2001.

Appendix A

TBD Project Rocky Flats Disposal Orphans [Kiess, 2001]

Material Group	Container	Quantity	Activity ID	Planned Disposition
Depleted Uranium (DU)				
DU Classified Parts	55 gal. Drums	~210 Barrels	1BBDA0007A	NTS
DU Unclassified Metal	55 gal. Drums	~80 MT	1EDD5014	NTS
DU Samples	3013/9975	One item, quantity may be classified	Unknown	TBD (Likely NTS)
DU "RCRA-Suspect" Roaster Oxide (LLM)	55 gal. Drums	390 Barrels/66 m3	1EFD1945	TBD (No Plan)
DU Roaster Oxide (LLW)	55 gal. Drums	190 Barrels/32 m3	1EFD1945	TBD (Roaster Oxides meeting LLW criteria will be shipped to NTS)
DU Dummy Pits	55 gal. Drums	3 items	1BBDA0007A	TBD (LLNL, NTS?)
Sealed Sources				
Sealed Sources Neutron Pu-238/Be	TBD	1 item	1EFD5880	TBD (LANL OSR Project?)
Sealed Sources Neutron Pu-239/Be	TBD	3 items	1EFD5880, 1EFD4785	TBD (LANL OSR Project?)
Sealed Sources Neutron Cf-252	TBD, Oak Ridge will provide	5 items	1EFD6405(?)	ORNL

TBD Project Rocky Flats Disposal Orphans [Kiess, 2001]

Material Group	Container	Quantity	Activity ID	Planned Disposition
Other Sealed Sources	55 gal. Drums	Thousands of items	Various	NTS (for those sources for which no receiver site is found for reuse)
Samples, Standards, and Technical Materials				
Samples Np-237	3013/9975	5 items	1AC0804700	TBD (2 items to WIPP, 2 items to SRS)
Samples Pu-238	TBD	53 items	1DHD500MS8, 1AC0804700, 1EFD5880	TBD (Return to LANL?)
Samples Thorium	TBD	1 item, 1kg.	1AC0804700	NTS
Liquid Standards	TBD	~163 items	1AC0804700	TBD (Ship to NTS after removal of liquid if LLW, or ship to WIPP if TRU)
Other TBD's				
Contaminated Parts				
Contaminated Parts/Classif. Inorg: LLW-Bound		~200 Barrels/10 Drums	Various	NTS (for materials meeting LLW criteria)
Contaminated Parts		~375 Barrels	Various	TBD (WIPP for materials meeting TRU criteria)
Special Items				
12 Specials		12 items		TBD (LLNL?)
5 Greasy Specials		5 items		TBD (SRS?)
Other Waste-Bound				

TBD Project Rocky Flats Disposal Orphans [Kiess, 2001]

Material Group	Container	Quantity	Activity ID	Planned Disposition
Disposition Streams				
DU Cemented Composite Chips				
DU Trench T1 Chips				
LEU Samples				
LEU Oxide				

Appendix B

Dummy Pits Listing [NPD, 2000]

Number	P/N	S/N	Destination
1	250448-00	0006	SL
2	18Y-304549-11-SOW	4351101	XX
3	251405-00	7503	LL
4	251158-00	8940	LL
5	251405-00	2074	SL
6	252046-02	2557	LL
7	250160-00	0001	LL
8	421292-00	0001	DN
9	421468-00	2060	DN
10	421468-00	2064	XX
11	421468-00	3210	SL
12	420948-00	2006	DN
13	420948-00	6119	SL
14	420948-00	3005	XX
15	420948-00	3004	XX
16	420948-00	3006	XX
17	420948-00	6127	XX
18	421381-00	1603	SL
19	TRAINING DRUM	2033R	XX
20	TRAINING DRUM	2077	XX
21	2725528-00	8063-53682	DN
22	2725528-00	46775	XX
23	2725528-00	47621	SL
24	2725528-00	48760-1	XX
25	2725528-00	48760-2	XX
26	2725528-00	48760-3	XX
27	2725528-00	783-53681	NAZIR
28	????	1522	DN
29	????	7087	SL
30	TID 75746/7529 memo#48760		XX
31	206PS-10401-AE-10	10401	XX
32	206PS-10402-AE-11	***(deleted)***	***XX***
33	206PS-1040***3***-AE-12	***Dummy K2-K5***	***XX***
34	654D4-437-02, 926437	0002	XX
35	654D4-437-03, 926437	0003	XX
36	????	3207R	SL
37	U-301-E-4889-0006	0006	DN
38	211535-00	0001	LL

Dummy Pits Listing [NPD, 2000]

Number	P/N	S/N	Destination
39	***250352-00***	***0001***	***SL***
40	????	83 MOCK-1	LL
41	????	84 MOCK-1	LL
42	SOW	???	LL
43	LIT-DPT-01	***0001***	***XX***
44	????	7110	DN
45	???	???	LL
46	TRA	3963	DN
47	TRA	9615	LL
48	250434	DEV-001	LL
49	IRD-DUCAMERA2	???	XX
50	***206PS-10400***		***XX***

SL – Sandia National Laboratories, NM
LL – Lawrence Livermore National Laboratory
DN– Defense Nuclear Weapons School
XX– No Need Identified